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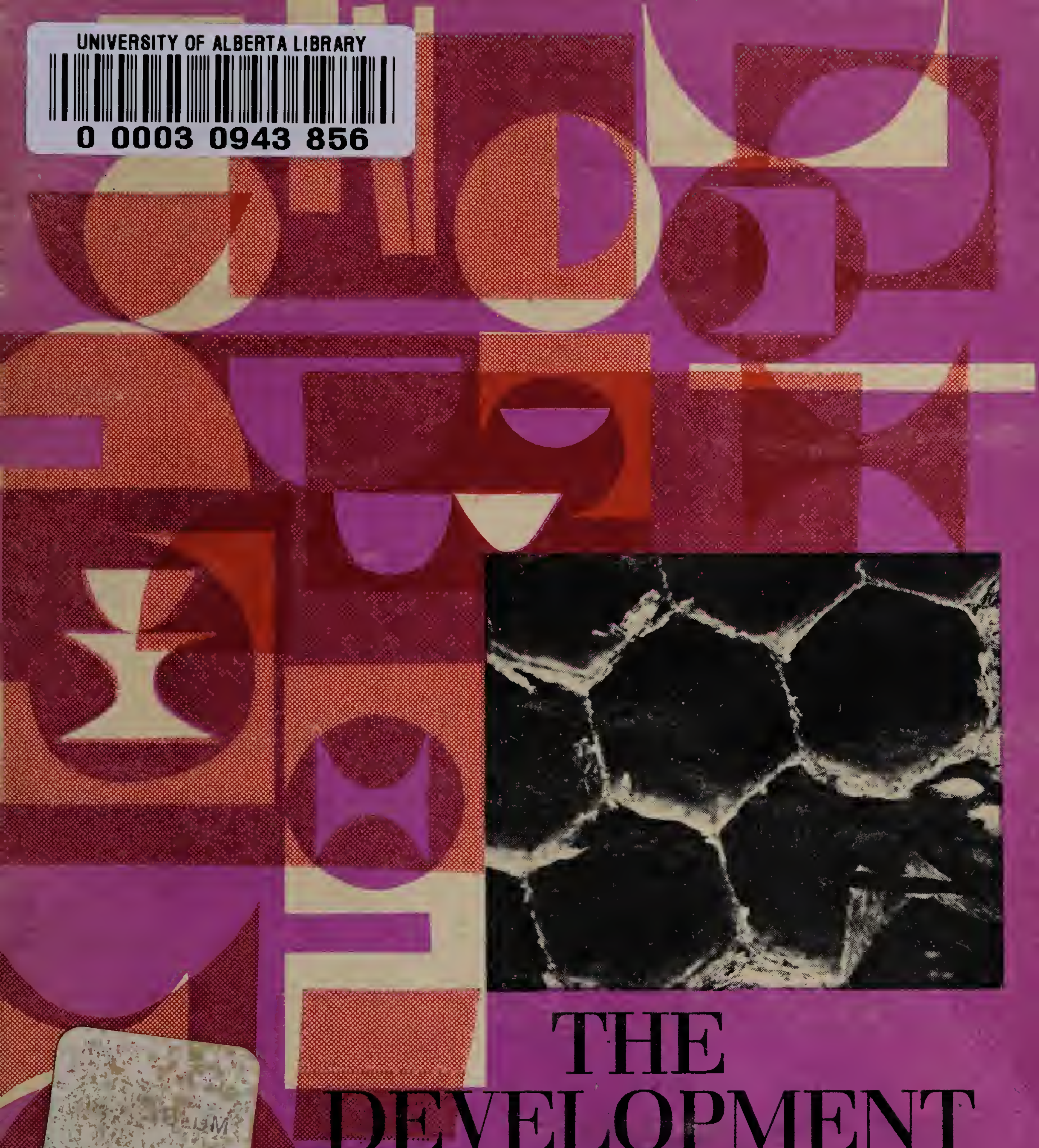

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THE DEVELOPMENT OF SHAPE

by Kurt Rowland

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NOTES FOR TEACHERS

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LOOKING
AND
SEEING

Part 2

THE DEVELOPMENT OF SHAPE

Notes for Teachers

by Kurt Rowland MSIA

Ginn and Company Ltd
18 Bedford Row
London WC1

The list of picture sources on pages 37-47 will indicate the many people who have provided me with photographs to illustrate the textbook, and I should like to offer all of them my sincere thanks. Unfortunately, however, it has not been possible to trace every copyright owner.

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INTRODUCTION

1 The purpose of this course

Looking and Seeing, a course of four books, provides a training in visual understanding and discrimination: a course of visual education. Although in recent years much has been said and written about the importance of visual education, no textbook on the subject has yet appeared. Until now, anyone interested in teaching it has had to make up his own course or resort to books which deal, often from a specialist's point of view, with various aspects of vision, design, engineering, town planning, and so on. This is not only a complicated process in itself but involves a task of abstraction comparable to teaching first year biology from erudite books intended for medical students or biochemists.

The four parts of Looking and Seeing are, it is believed, the first school textbooks of visual education ever to be published. They present basic visual knowledge in easily graded chapters and, like so many books in other school subjects, include exercises involving activities of various kinds.

This is *not* a course of design appreciation with vague descriptions of well-designed objects. The author believes that the problem must be attacked at a deeper level, so that pupils will eventually acquire a foundation of knowledge on which to base sound visual judgments of their environment. Such informed judgments will replace the bewilderment and indifference so often found at present. The richer experience of the physical world made possible through Looking and Seeing will allow readers to enjoy new outlets for self-expression and will stimulate creative and positive attitudes.

2 The plan of the course

The organisation of Looking and Seeing arises from a simple progression. Parts One and Two could be considered as a grammar of vision, in which the elements of which our visual world is composed are discussed and analysed. Parts Three and Four show how this grammar may be applied.

PART ONE/PATTERN AND SHAPE

Readers are encouraged to look at the world around them. Patterns feature prominently. They serve as a useful means of explaining and relating other concepts: for example, environment, social forces, character. In the last two chapters the idea of form is introduced.

PART TWO/THE DEVELOPMENT OF SHAPE

The story of form is continued, but on the level of technology. Tradition and modern materials impose their own aesthetic on the objects into which they are formed. This aesthetic is guided by a natural development, rather like the evolution of natural organisms, in which function asserts its supremacy.

PART THREE/THE SHAPES WE NEED

This part deals mainly with the two strands of design: the purely mechanical and mathematical, and the human. Ideally, the man-made world should be a synthesis of the two. This synthesis provides a visual language.

PART FOUR/THE SHAPE OF TOWNS

The town is considered as the most complicated and ambitious man-made shape. Basically we are here still grappling with design problems which confronted the early craftsmen, but on a very much vaster scale, one which is likely to increase in complexity within the next generation.

PLACE OF LOOKING AND SEEING WITHIN THE SCHOOL CURRICULUM

The subject matter of this course will be better understood when related to other school subjects. The relationship between society and pattern can be the subject of an historical study, the relationship between man's surroundings and the patterns he produces could be linked to geography. If crafts such as pottery or weaving are practised in the school a fruitful liaison could be established. The diagrams or drawings derived from a study of everyday patterns can be used in art lessons. In this way a cross-fertilisation will ensue; not only will the course gain in meaning through association with other subjects, but it will surely enrich these subjects as well. It will also introduce the idea that all fields of knowledge are somehow part of the same endeavour.

THE EXERCISES

The exercises at the end of each chapter form an essential part of the course. If possible these should be executed in a book, or else on sheets of unruled paper or cartridge paper and kept in a folder. It is most important that past work should be available for reference, so that the growth of the pupil's ideas and vision can be surveyed by teacher and pupil. Furthermore, such notebooks should never be approached with any kind of formality. On the contrary, the children should be allowed to enter spontaneously, in graphic or literary form, any observations they think relevant, and to add any subsequent observations from time to time, even when this conflicts with ideas of neatness. The exercises are not meant simply to implement rules derived from the lessons; they aim to stimulate further ideas and individual initiative. This stimulation must be considered the most valuable part of the course. The subject matter of Looking and Seeing cannot possibly be absorbed in the same way by people of different temperaments and abilities. Some notebooks will undoubtedly be stronger on the literary side than on the visual, others may be more visually discriminating, but all readers will share an increase in creative power.

NOTES ON PART TWO: THE DEVELOPMENT OF SHAPE

Chapter 1 The forces which shape materials

Form is the outcome of forces acting on a material. When the material and the forces change, the forms they create must also change. This can be shown by examples from the technology of the Stone, Bronze, and Iron Ages.

A form is the outcome of the interaction of forces and materials. A stone may be shaped by many different natural forces and in each case a different form will emerge. Again, the same force applied to different kinds of stone produces different forms. Obsidian breaks in a markedly different way from sandstone, for example. Part One showed the relationship between materials and patterns; we now discover a similar relationship between materials and shapes. *pages 5-6*

An understanding of the development of tools through many intermediate stages is vital to this theme. What appears to be the final and most perfect solution is eventually challenged by the advent of new materials and new techniques. This process is particularly relevant today, and is therefore described in some detail. It should be closely followed, each stage being thoroughly understood before going on to the next. To study these developments with the help of actual exhibits in museums, and in greater detail, where circumstances permit, would undoubtedly make them more vivid. To relate them to archaeology and the social development of man—hinted at here and there—would heighten the significance still further. But let us substitute for the usual purely historical attitude a study of man's increasing awareness of the character and properties of the materials he found and his acquisition of suitable techniques to master them. This study shows us techniques which evolved because of man's ability to observe and understand the properties of the materials at his disposal. *pages 7-14*

It is important to notice that tools produced even in the early ages of conscious tool-making bear every mark of attempts to go beyond the dictates of mechanical function. The shapes are more refined than one would have expected pure utility to demand. Sometimes the absolute mechanical efficiency of shapes and patterns is temporarily and to some degree sacrificed in this cause. One can only guess what inspired the patterns of **10**, page 9, and **5**, page 12, and in the latter case the retention, as symbols, of obsolete forms (rivet heads). Furthermore, it is quite likely that the primary purpose of the loops cast integrally with the body of the spearhead was to allow streamers to be fastened to it. In many subtle ways the shaping of tools was directed by motives which can only be described as metaphysical. Tools had to satisfy these needs as well as those of material efficiency.

Without going into great detail one could also reflect on the effect which the shaping of tools and other objects had on the human mind. For instance, the shaping of pottery vessels must have given man a sense of magical powers over his environment, for he had transformed a soft material, amorphous and indifferent, into useful shapes of hard and definite structure. The making of objects became associated with magic. Even as late as classical times we find a toolmaker, Vulcan, elevated to the rank of the immortals.

page 15 EXERCISES

The stone axe, 4, would soon lose its tips in actual use. The opposite end was used as a hammer. While the thickening into a bulbous shape is natural to bronze, which will produce such a shape when used for hammering or beating, it is quite inappropriate and impractical for stone.

The wrought iron screen, 5, is a natural outcome of the method by which it was produced but that does not mean that this is the only correct pattern.

Chapter 2 Modern materials need modern shapes

Technology attempts to make the most efficient use of materials and production methods. To understand the shapes produced by modern technology we must know something of the materials and processes employed. A discussion of the principles of plastic and reinforced concrete shapes; these shapes can be explained in terms of the character of the materials and the methods used to form them.

The craftsman working in a vernacular tradition instinctively relates his material to his process. He would no more wish, or be able to, work against the apparent laws of nature and the traditions of his society and environment, that is in a different idiom, in a different 'style', than a rose could bear apples. He is so much the interpreter of his own tradition that the forms he produces have the 'rightness' of natural shapes, in which the material and the process (and the function) are in a harmonious relationship. Many a humble village church, such as the one on page 3, shows this natural sensitivity at work. These relationships were, until the eighteenth century, understood not only by craftsmen but by the community as a whole. Today we have almost completely lost this capacity. Moreover, in our society the variety of materials is so great, the processes employed so complicated that our knowledge of them cannot be complete. Our judgments are therefore uncertain. Not only have we lost the ability to recognise harmonious relationships, we even lack the basic feeling we once had for everyday materials. We neither know nor feel what is a good, i.e. an efficient and harmonious glass shape, or pottery shape, or what is a 'woody' shape. How can we hope to experience new shapes made of less familiar materials, such as the camera on page 2?

Experimenting with materials will help us to understand them better and give us an idea of the shapes through which an object has to pass on its way to its final shape. This development is an integral part of the shape; everything contains its own history as well as that of its species.

Visits to factories, together with a clear explanation of the basic processes, are valuable. Plastics works, glass works, metal works, potteries, furniture factories, and even those producing pre-stressed concrete units are all worth visiting.

The planning of such a visit is most important. First of all it should be ascertained that the products of the factory do in fact bear out the principles expounded in Looking and Seeing. It is also of the greatest importance that the salient points emerge clearly and unmistakably from such a visit. Much time can be wasted on inessentials which will not only reduce the time allowed to the basic processes, which are after all the whole point of the visit, but could have a muddling effect. A projected visit should be discussed in advance so that the pupils know what to expect and what to look for. However, factory visits will not be fully effective unless they are coupled to considerations of wider issues (e.g. the role of the handle of the cup). Members of the technical staff of factories who often act as guides are only rarely aware of any wider issues relating to their products. This may mean that a certain amount of research must be undertaken by the teacher, or in some cases it could be made the theme of an individual or communal project. It may also be possible to relate two different materials and their different processes to each other, especially where products are in competition. The watering cans, **1-4**, page 26, provide one such example, and many more can be found among furniture and other household goods. Often technical points will arise, which can only be settled by those closely associated with the product.

The production of the wine glass, **3, 4**, page 17, shows how pattern and shape may be related to each other as well as to their common material when produced by the same process. All relationships fall into place.

pages 26-27 The plastic watering can, **4, 6**, is an ingenious structure (e.g. the clasp becomes a handle when used as a bucket) which exploits its material (e.g. the transparency of the bucket makes it possible for the measuring scale to be read from the outside) and has a natural rhythm (e.g. the line of the handle).

page 28 The shapes of the objects on this page are designed to make the most of the opportunities offered by their materials. The plastic part of the camera, **2**, takes full advantage of its production methods. The fine detailing is further shown on page 2. The designer of the bucket, **1**, could have imitated the pattern and form of a zinc bucket but that would have made it less efficient as well as less pleasing than in its present form. The bucket was primarily meant for use on building sites. Its reinforcements stiffen the walls vertically, so that heavier loads can be carried. The walls remain flexible horizontally so that they can bend to allow layers of dried, hard cement to be removed.

Each material has its own disadvantages which a good designer will always bear in mind. These disadvantages impose limitations on the design, but may be more than compensated for by the advantages of the material. If a shape specifically designed for one material is imitated in another material, the design limitations of both are added, while many of the advantages of both are excluded. Such shapes must therefore be less efficient. Neither do they possess the natural harmony which exists between a material and the form designed in accordance with its character. Imitations always fall between two stools.

The photographs of the chairs show many attempts to explore the possibilities of different materials—and their combinations—for this purpose. Although no aesthetic judgment is intended, the relationship between form and material will be quite obvious. The bent plywood chair, 14, page 31, is a good example of how a designer, through his understanding of the character of his material and his sensitivity to it can channel it into forms wholly satisfying from every point of view. Yet if such a shape were applied to another material, such as fibreglass, it would be completely unsuccessful. This type of comparison—another example of further work which could be carried out by pupils on their own—can be applied to other objects. *pages 30-31*

Shapes designed to take advantage of a particular material—reinforced concrete, for example—come close to the concept of organic shapes. (This is foreshadowed on pages 122, 123 of Part One.) Often these shapes have an elemental quality, the supports of the stairs in 5, page 37, for example, as well as other shapes in this and other chapters (the ship's mast 4, page 41, the plastic jug 5, page 27). *pages 32-42*

The shapes of reinforced concrete are above all calculated shapes, but although such mathematical shapes will play an ever-increasing part in human surroundings, they cannot by themselves be considered satisfactory until they have been sifted and interpreted by the architect's intuition. In good modern shapes the materials themselves or the details of their construction provide their own decoration. The cables, spine and ribs of the Saarinen structure, page 42, the shape of the bent plywood chair, **14**, page 31, the structure of lamp post, **3**, page 40, are all part of the visual language of our times, emphasising as it does the essential character of things. (The term 'visual language' is discussed in Part Three.)

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EXERCISES

The exercises are as usual designed to consolidate and to stimulate. Everyday objects should be brought to school, discussed and compared from all possible points of view. They should be related to processes of production and to function. Possible improvements in design could be suggested. Actual objects should be used in discussions of this kind as far as possible—photographs are after all only substitutes (but better than nothing). To be able to handle a cup is worth more than all the clever photographs which could be made of it. The writing-and-drawing method of observation and expression should once more be used as fully as possible. The wheelbarrow, **4** (a prize-winner in a competition), shows an ingenious use of the material by an outstanding designer, but it has certain functional disadvantages inherent in the material. The handles, for instance, are formed by projections of the main body of the barrow, strongly curved for structural strength. This seems the most logical thing to do for now the whole shape, apart from the wheel, can be moulded in one piece. It also makes for visual unity. But the handles are far from comfortable.

Chapter 3 Shapes with a purpose

The evolution of natural and man-made shapes is guided by function. The role of intuition and calculation in the creation of man-made shapes, which reflect mental as well as material needs and functions.

pages 44-51

Natural shapes are determined by natural necessities, such as resistance to the forces acting on them. When these forces change, the structure of the organism must evolve to meet the changing conditions if it is to remain in existence. The evolution of the horse from a small, dog-sized browser to its present shape is a classic example of such a series of changes. If all the conditions which caused these changes were available in the form of mathematical data it would be possible to show the evolution of the horse's skeleton in much the same way as the evolution of the crane, page 46. But although this is not possible the comparison can be appreciated.

Structural strength is not always the determining factor. The colours, patterns, textures and even the sizes of natural shapes are all important to the efficient workings of the organism. The principle of evolutionary change is an important one and is pursued throughout this book. Nature's shapes, patterns, and colours are considered sufficiently pleasant by most people to be imitated, often in a thoughtless fashion. Yet these 'aesthetic' shapes are all the outcome of the stern laws of natural selection, surviving because of their efficiency (examples on page 50). When man-made objects are allowed to evolve in the same natural way they readily fall into graceful, harmonious shapes and patterns. But while natural shapes have to conform only to the needs of material efficiency, man-made shapes must also meet the needs of the human mind.

We know that evolutionary changes are very slow and that although natural shapes are always approaching maximum efficiency they may never reach it because of constantly changing conditions. Many natural forms follow the stress lines of the forces to which they are normally subjected, because in this form they are best able to resist the destructive effect of these forces. But they sometimes take millions of years to arrive at these shapes. Man-made things follow a similar evolutionary pattern, although because we are largely able to calculate the forces we are dealing with, the process is speeded up. For example, the method known as photo-analysis produces, by the use of polarised light, photographs of the forces which must be resisted (**9**, **10**, **11**, page 47). These photographs can be of great help to the engineer, industrial designer or architect. Stress diagrams of this kind cannot always be translated direct into shapes, as many other requirements must also be satisfied, such as ease of production, but where they are followed, stronger structures and better shapes are the result. Stress lines can be easily followed in reinforced concrete, and where this is done the effect is very similar to that of natural shapes.

The aim of the engineer, as that of nature, is to produce a structure or shape in which stresses are uniform. A seventeenth-century scientist poses the problem in this form: 'It would be a fine thing if one could discover the proper shape to give a solid in order to make it equally resistant at every point, in which case a load placed in the middle would not produce fracture more easily than if placed at any other point.' Modern methods of research, calculation and production can approach such ideals, which men have dreamed about for centuries. Shapes such as the crane hook, **11**, page 47, are so well-designed that, when they are over-stressed to breaking point, fractures will occur simultaneously in many places—there is no weak spot which will fail first.

pages 54-59 The structure of the Gothic cathedral is a functional design which evolved from earlier methods of building. As we watch the evolution of Gothic, noticing the various alternatives from which it was selected, the comparison with the evolution of organisms becomes very striking. The Gothic cathedral appears to change its shape and to grow appendages and faculties where they are most needed and in such a way that a more efficient shape results. The development of Gothic is a long sequence of logical events. But since man-made things have to satisfy not only the various physical forces acting on them, but also psychological, political and social forces, the comparison with the evolution of natural shapes must obviously be modified.

pages 60-61 Some of these extra-material considerations can be traced in the evolution of most man-made objects, as in that of the chair, shown in outline in pictures **3** to **7**.

We are now witnessing the development of various new ideas, the hovercraft and the monorail for example. Such things will have to evolve according to mechanical needs as well as to human values. If the structure of our society or our psychological make-up were to change, it would give these developments a new impetus which would change the course of their evolution as though the laws of the physical world had changed. *pages 62-64*

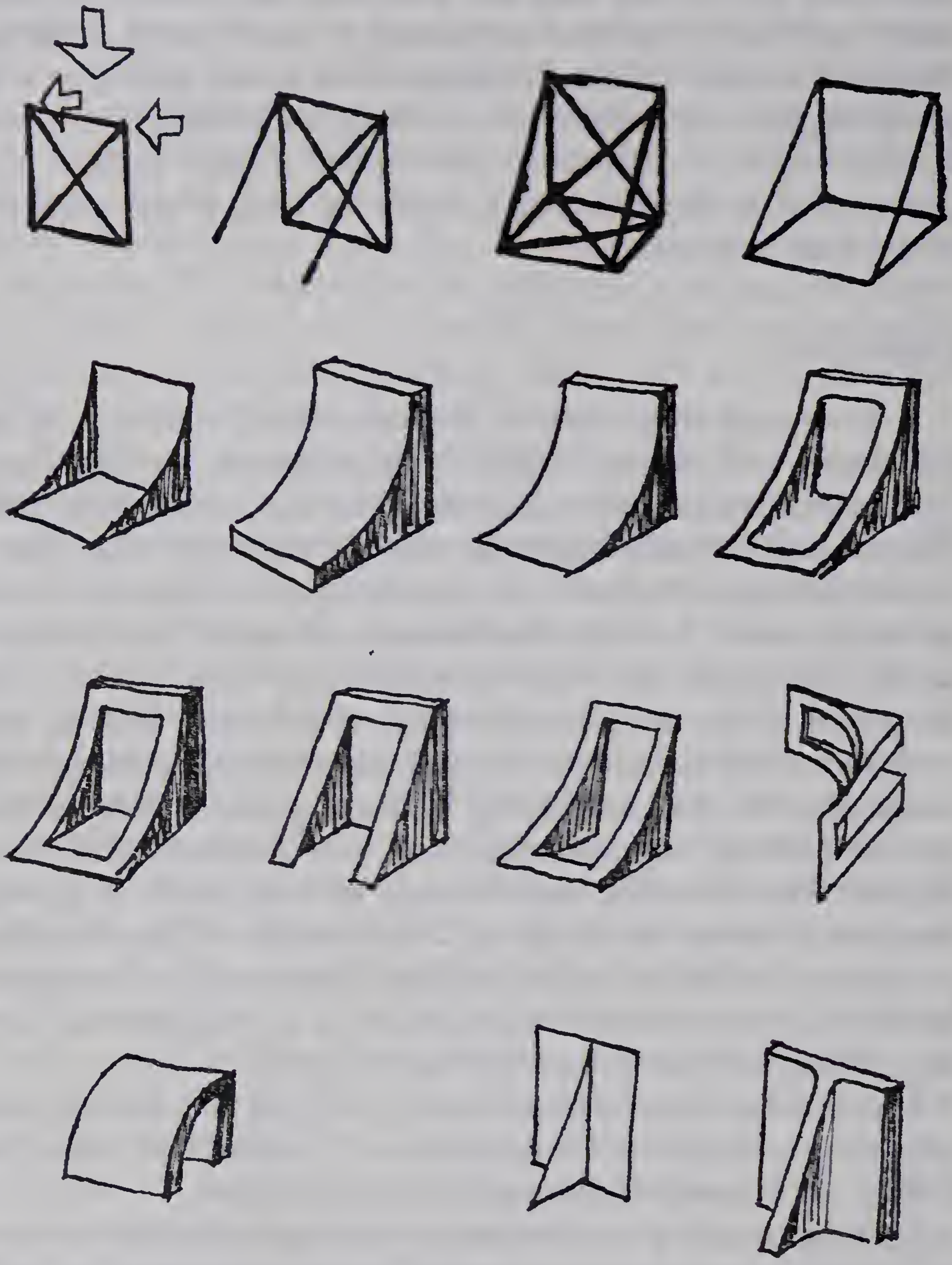
EXERCISES *page 65*

A functional shape then is the outcome of evolution or its substitute, calculation. Often both processes are involved. The exercises provide typical examples but it should be possible to find literally hundreds more if required. The wheel at first followed the line of an increasingly efficient use of the material, wood, but the introduction of metal (last drawing in **6**) influenced its later development. One could add the wheel of the modern motor car as a further link in the evolutionary chain. Some of the changes which the telephone underwent are also interesting from the point of view of the introduction of new materials and new methods of manufacture. The fork-like receiver-rest, at first made of metal, was later imitated in plastic (**9**). But because of the fragility of plastic this form proved unsuitable. Eventually a new shape for the receiver-rest was devised, more in keeping with moulding techniques and the properties of plastic (**11**).

The development of boats, carts, ploughs, etc., should give ample opportunity to investigate how practical and beautiful shapes are created within vernacular traditions.

Exercises 2 and 3 are prototypes of possible further work—the subject matter will once again depend upon interest. The important thing is not so much to achieve brilliant designs but to get pupils into the way of thinking *creatively* about practical problems, bearing in mind material and other requirements. Negative attitudes should be discouraged. The engineer and the artist both work in this way, but many other trades and professions would be enriched and their products humanised if such attitudes could become more universal.

There is endless scope for any pupil's ingenuity. Having understood the basic principles of some of the processes of



The top four diagrams show how the problem posed in exercise 3 can be met by buttressing the frame and then joining frame and buttresses in one structure. Compare this to the evolution of Gothic building methods (pages 56 and 57 of the textbook). The basic structure can be interpreted in plastic in many different ways. The examples shown in the other three rows of diagrams are not necessarily practical production models but they show ways of visual thinking.

moulding he can now apply them to simple problems. The straight pieces of wood and the sharp corners (top row opposite) may be transformed—but not necessarily. Further changes will occur as the function changes. There are several possibilities which will need some original thinking, but this is by no means beyond the scope of most pupils. Other such exercises can be devised, perhaps even with objects in everyday use. Each pupil should be encouraged to experiment with small-scale wooden models. They should also supply a written and drawn answer to explain some of the thought-processes.

Such exercises can be carried out individually or as group-projects. In either case discussion among the pupils will be of the utmost importance. If exercises like these are carried out at intervals, this new approach to man-made things will become the accepted one. It will act as a much needed counter to the false visual values based on the distorted and irresponsible shapes of many of our consumer goods, which are meant to 'look' rather than 'work'.

The chapter attempts to induce pupils to consider architectural problems as problems of structure and function, similar to those of engineering and of natural shapes. The field could even be considerably widened. It may seem strange at first to put cathedral, foot and crane into the same category, but this will increase understanding of architecture and design in general, as well as of biology, and physics.

Chapter 4 Honest shapes express their function

Man-made shapes should be honest expressions of their function. Imitation and attempts at 'style' show a lack of appreciation of basic values. Honest shapes express the spirit of their times.

pages 66-76 A designer may approach his problem from many different angles, but, in theory at least, whatever his starting point his solution should be the same. This cannot be wholly true of the more complicated shapes, but it nevertheless expresses a tendency. Why, then, we may ask, are objects which are meant for the same purpose often of such vastly different shapes? Why do they fall so far short of maximum efficiency? Many of the shapes with which we have become familar during the last two hundred years could only have been accepted in a society in which everybody's vision—designer's, craftsman's and consumer's alike—was blurred.

It may be argued that the imitation of past styles which is such a feature of eighteenth- and nineteenth-century architecture and design was practised in earlier ages as well, notably the Renaissance. This similarity is purely superficial and the two periods have very little in common.

The early Renaissance architect and artist borrowed some classical symbols because they corresponded to the new ideals. The medieval methods of building had become not only scientifically out-dated but also spiritually inappropriate. Out of the classical elements and many of their own creation they constructed a new, universally understood language, which was supported by a theory of beauty which took full account of the requirements of the period. To the Renaissance architect or artist it was never a question of choosing a style, he recognised only the *contemporary style.*

But in the eighteenth century aesthetic matters passed into the hands of the 'man of taste'. The idea of 'beauty in the eye of the beholder' gained acceptance, and 'taste'—not the universal laws derived from the Renaissance—became the final arbiter in matters of aesthetics. The term 'style', originally a literary expression, was applied to other arts: to painting in 1706, to music in 1728, and to architecture in 1749. The shapes of man-made things now became a question of choice between different styles and different idioms. Because the dilettante and not the craftsman was in command, style was more important than the efficient use of the material and its relation to function. The new styles had to be based on 'culture' and 'history' and, unlike the visual languages of past ages, were not meant to be understood by ordinary, untutored people. The new ideas of style, therefore, struck at the very roots of tradition and evolution. Later on, the Romantic Movement added its weight to the break-up of the vernacular tradition. 'Ever let the fancy roam . . . everything is spoilt by use.'

In many ways the eighteenth century saw a very high level of artistic achievement, for instance in the design of furniture, country houses, landscaped gardens, towns, and also of villages, which tried to relate human needs to natural charm, but it also saw the beginning of the disintegration of tradition, symbolised by that supreme example of non-functional building, the folly. Because erudition and knowledge became more important than the vernacular tradition, organic shapes, in which each part was integrated and related to the rest, were abandoned in favour of 'aesthetic' shapes. Ultimately buildings could be erected in which plan and elevation were unrelated, so that the inner structure and layout could no longer be guessed from the outside: railway stations like cathedrals, banks like temples, factories like castles. The organic unity of a building was destroyed; the façade became a curtain which hid the internal structure. Utensils were also made in this spirit. When taken to their logical conclusion such ideas could produce salt cellars disguised by architectural ornaments often of outlandish derivation, wooden shapes which owed nothing to their material and the tradition based on it, but rather to that of other materials (the wooden urn in imitation of the Greek pottery urn, **6**, page 73, is a significant example), and fabrics which were decorated with patterns wholly inexpressive of their character.

The bureau, **4**, page 70, is a large ornament rather than a piece of furniture. The shapes of the drawers must have tested the cabinet-maker's skill but this is a misuse of technique and material. The drawers could not have been easy to use, and the kneehole is not large enough to be effective. One cannot imagine that this bureau was actually used as such.

The chair, 3, page 70, shows similar trends. Adam could still get away with wrong principles, but his age laid the foundations for the horror which was to come.

The abandonment of traditions which were based on craft and function was bound to have a bad effect on the appearance of most things. In the framework of a tradition and its accepted rules even indifferent craftsmen can produce objects of a reasonable standard, while such tradition does not impede progress by the great. But deprived of material criteria even the best felt uncertain. A definite downward trend soon became noticeable and accelerated throughout the nineteenth century, giving the productions of that period their distinctive flavour. The sceptical twentieth century repudiated these artificial values, so that plan and elevation, inside and outside, could once more be given their proper roles as different aspects of what is basically the same structure. Harmony of man-made environments is slowly returning as the functional organisation of objects and buildings, in terms of the materials employed, re-asserts itself and permeates the whole shape. Modern architects have even begun to reject the idea of houses with a distinction between front and back (Peterlee, page 47, Part One, has such houses). Like an organic shape, a house should have purpose and therefore meaning from any angle. It is clear that the mental climate of our time is reflected in these developments.

Imitation is still sometimes condoned on grounds of matching existing, older buildings or objects, but this argument has no substance; it would, taken to its limit, inhibit any kind of searching and originality. Problems would never be solved. But this does not mean that the old should always be disregarded. 1, page 72, shows two buildings which could not be more different in technique and spirit, yet they do not fight each other. This is at least in part due to the second architect's understanding of his problem. He designed the building for this particular position and this must have influenced his design not only in the conscious alignment of cornices but also in a more unconscious way. One can, on the other hand, find many examples of unhappy juxtaposition of old and new buildings. The problem of combining old and new, however, is one that can never be solved by pure imitation.

pages 77-79

In spite of the growth of the modern movement, all is not plain sailing—as yet. These pages show how the positive, creative ideas of our age are still avoided and side-tracked, both by continuing the nineteenth-century imitation of past styles, and by being modern at all costs, even at the price of honesty. The objects on page 79 put the cart before the horse. Modern shapes come about when they are interpreted in the spirit of one's times, not by distorting function or violating materials. Naked, 'significant form' without regard to material and function seems to be the fetish of these modern objects, just as 'historical' precepts with a sloppy regard for natural forms and patterns were the fetish of the last century and its extension into this.

pages 80-81

These two attitudes are shown to be equally inappropriate when compared and contrasted with a genuine twentieth-century theory of design. Both **2** and **3** are completely off the mark and irrelevant. **3** is not by any means an extreme example. Most people would, apart from the figures, acclaim it as contemporary. Because such insidious designs are much more difficult to recognise than out-and-out atrocities it is important that they should be shown and discussed here. The juxtaposition with good designs, as shown on these pages, should make the difference clear, and is perhaps the best line of attack. The designer's drawings (page 81) show how shape and dimension are related to function. They are also related to modern production methods. The outcome is a set of organic shapes, which are not only mechanically but also psychologically efficient for the refined mechanism they house.

pages 82-85

The principles of Le Corbusier's chapel at Ronchamp are similar to the foregoing but the values are different. The building is efficient as a place of peace and prayer, and because it is a genuine organic shape it is expressive from every angle. It is one of the greatest examples in recent times of a form most capable of generating more and more harmonious faces. Several critics have referred to it as large-scale sculpture, and this only serves to show up the poverty of much modern architecture in its realisation of form. The chapel seems to induce the spectator to move round it, to absorb, to fathom, to understand its complicated and mysterious form. The funnel-like opening in its exterior surface, between two curving walls, draws the onlooker inside like a maelstrom. The interior forms, now negative, concave, act in a like manner. The desire to move about is accentuated by the deep-set windows, of which only a few can be fully seen from any one viewpoint.

pages 86-87 The objects on these pages are also honest, logical, organic shapes. Even the sand hopper (**6**) may claim to be considered as a work of significance.

page 88 EXERCISES

Further comparisons between good and bad shapes are required by exercise 1. The plastic rocking horse, **3**, seems to be efficient in a blunt, material way, but psychologically it is of course quite indefensible and therefore inefficient. One can but hope that only a plastic child would ever want to play with it!

Exercise 2 could be answered by a statement on the relationship between designer (or artist) and customer. The ground has been covered in the chapter (pages 70-71).

Exercises 3 and 4 should give us another set of shapes for comparison. It is once again a question of honest versus dishonest design, although practical considerations will also enter into it. A lamp post which cleanly and economically sweeps forward to hold a lamp over the area to be lit would qualify as an honest shape, as would a chair designed in the idiom of its material to contain the human body. Oast houses, kilns, aeroplanes, machine parts such as gears and pistons, should come to light in this context. On the other side of the fence there should be no difficulty in finding 'styled' objects, from motor cars to toasters, in which the designer was concerned to create an impression and draw attention to his ideas rather than make an honest statement. The discussion of differences between the two groups of objects could lead to a judgment of standards and values.

Most answers to question 5 will probably come from the present or the immediate past, but it may be possible to consider a period in history, perhaps the one currently being discussed in history lessons, from this point of view. We shall discuss the question of the spirit of the times at greater length in Part Three, but we can establish here that a harmonious pattern results only when all man-made things are in tune with the spirit of the times so that they have something in common.

Exercise 6 will to a certain extent follow on from the last exercise and will be answered only by the brighter pupils. The societies which sustained Greek and Gothic art, although very different, had something in common: they were both integrated societies, carried forward by a strong yet unconscious sense of direction. In such a climate alien concepts cannot easily be assimilated because they do not fit into the existing system. Conversely, a society which has no strong sense of direction takes refuge in imitation. Imitation is symptomatic of a society in the throes of disintegration.

Chapter 5 The surface of form: pattern and colour

The surface of a shape, its pattern, texture and colour must be in harmony with its character. Function often acts as a unifying factor. Ornaments are extensions of forms.

pages 89-97 We have already hinted in chapter one of Part One at the character-giving properties of surfaces. This relationship between surface and form is now stressed and once again natural shapes serve as examples. Much of the chapter is self-explanatory and should provide further opportunities to judge various objects in the light of what has already been read. The objects on page 96 are particularly bad, but unfortunately they are examples of what is very often seen. The handles of 1 and 2 are designed without regard to their function; the handle of 2 will surely break very soon. The decorations themselves are insensitive; 1 is an outstandingly bad abstraction of natural patterns which neither stresses the character of the source nor creates anything significant in its own terms or that of its material. The purpose of abstraction is therefore lost. All the patterns are at odds with their shapes. By contrast, the patterns on page 97 show a pleasant synthesis of all the constituent elements, including the materials. They speak for themselves.

pages 98-105 Texture and colour are important to the surface of forms and should therefore be considered in conjunction with their environments. The paved square, 1, 2, page 98, and the garden, 3, 4, page 99, are considered in terms of patterns enriched and held together by textures. The pattern of the bicycle stands is given more breadth and brought into relationship with the flat surface which surrounds it through the intermediary of texture, 2, page 98. The five rings would have looked isolated on a plain surface.

Most people ignore the help and possibilities of textures when they build their own immediate environments. Not enough space can here be given to the discussion of texture and colour, but since a number of authoritative books deal exhaustively with these subjects (the bibliography, page 36, may be found helpful), they can be used as guides to any further study and exercises. However, the main theme of the chapter, that is, the relationship between various colours and between colours and surfaces, should not be forgotten.

The section dealing with ornaments has been incorporated in this chapter, which seems the most logical place for it if one considers ornament as an extension of basic form. Strictly speaking, ornaments should be used only to make an object's function satisfying to the emotions, i.e. emotionally efficient, but it must not do this at the expense of mechanical efficiency and so create disharmony. The application of ornaments therefore requires not only great skill but also, as in the construction of patterns, a profound understanding of the meaning and function of the basic shape. Ornaments, if they are used at all, must combine with pattern, texture and colour. *pages 105-11*

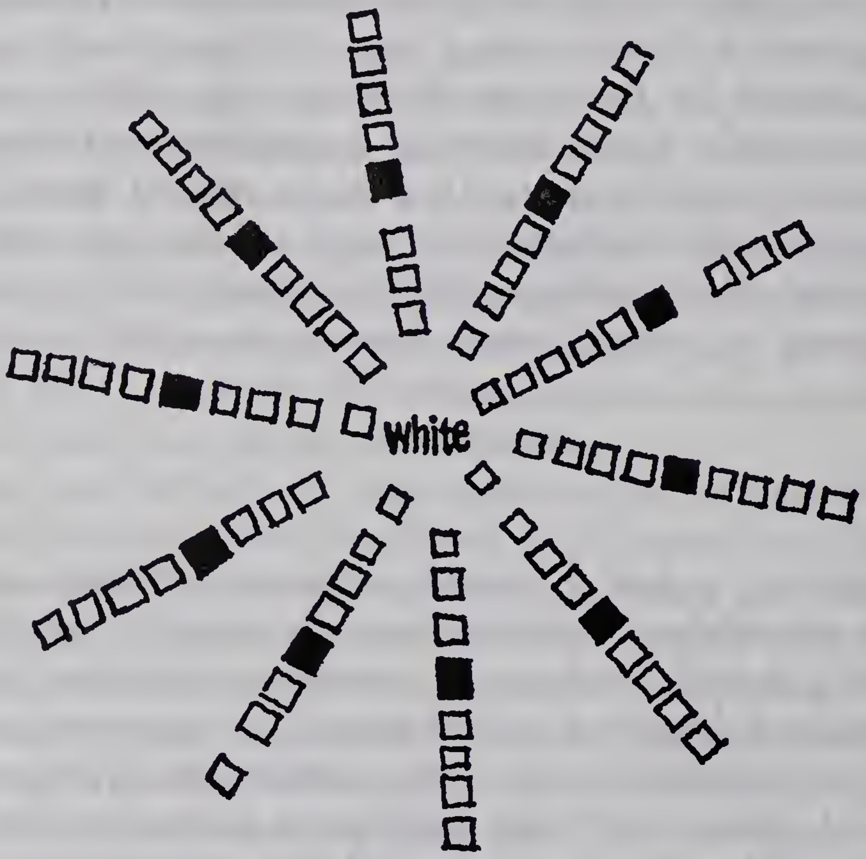
Blind imitation can once more be shown to be pointless. Perhaps the designer of the washbasin, 4, page 106, wanted to produce a shape which is akin to the shapes of nature; if so he set about it in the wrong way. Although one can find logical reasons for the shape of the scallop shell in nature it is not necessarily a good shape for a washbasin with its different material and function. In a more refined form it may have given some satisfaction to people of past ages with their background of mythology and symbolism. But to modern eyes 9, page 107, would seem closer to the organic shapes of nature.

EXERCISES

page 112

Exercises 1, 2 and 3 should not prove difficult and will serve to consolidate what has been discussed in the chapter. Exercise 4 should produce an interesting collection, perhaps arranged and displayed so that the shapes, patterns, textures and colours combine in the best possible way. The grouping of several items will foster judgement and selectivity. This exercise could well be accompanied by a written description. Exercise 5 could take the form of a description of a journey or holiday, or a project dealing with this aspect of a definite region or country could be worked out.

Further exercises might be undertaken in which pupils are asked, in group activities, to bring order into a chaotic mass of colour. A great number of coloured pieces of paper is necessary for this. These could be collected over a period from many different sources. One inch squares of flat colour cut out of advertisements, brochures, packages, and other printed matter should be assembled on a table. First of all pupils are asked to select the brightest colours and place them in order of the spectrum or the colour circle. (These are represented by the black squares in the diagram below.) The other squares are then arranged as shown in the diagram so that all the rows are composed of different tones of the same colour, approaching white towards the centre and black towards the periphery. Where certain values are missing a space should be left. Greyed colours should be kept separate. Such a chart, which could be made more permanent by pasting the pieces onto a neutral background, will be found useful for constructing colour schemes which can be used for practical purposes.



Exercises with coloured papers similar to D on the front endpaper could be carried out to study the effect of colours on each other. How colour combinations affect shapes can be investigated by using shapes, even quite abstract ones, instead of squares. These exercises should be purely experimental to start with: no preconceptions or theories should enter into them. Eventually the shapes in these exercises could be replaced by shapes of real objects such as chairs, tables and lamps placed against backgrounds of different colours. Later, simple patterns and textures could be introduced. Where printing facilities exist, outline drawings of interiors could be produced by means of simple lino cuts (or one of the more refined processes). Each pupil should be given three or four sheets showing identical arrangements and asked to fill them in, as in a painting book, using his experience from exercises with more abstract shapes. He should then be asked to describe the different effects achieved, bearing in mind that the basic situation is the same in each case. His description should refer both to each object individually and to the relationships between them. He should also be asked to select what appears to him to be the best colour scheme of this particular arrangement, and give reasons for his selection. Pupils should also be encouraged to produce simple line drawings (if possible based on measurements and executed to scale) of rooms at home and produce different versions, by using different colours, patterns and textures. Scale models, no matter how simply constructed, will be found to be even more telling. Colour can be directly applied with a brush, or alternatively the desired colour could be produced on a sheet of paper which is then cut to shape and pasted on the appropriate surface of the model.

Where facilities for model-making exist they could, if suitably exploited, lead to larger schemes. Decorative schemes for classrooms, hall, corridors, etc. in which colours, patterns and textures are indicated, could be evolved in this way, with regular class or group discussions, and when the time for redecoration comes, carried out. By such means pupils will learn how to plan their own environments. They will also learn that a scheme must be harmonious not only within itself, but also in relation to the room to which it is applied.

Chapter 6 A tool and a building: two efficient shapes

We can consider the visual impact of tools and buildings in the same way as that of natural organisms. The appearance of an object cannot be divorced from its technology and function—on the contrary, man-made objects and the whole of human environment can be satisfying only if they are visual expressions of their technology and function.

pages 113-28

The last chapter is a summing up of Part Two. The objects on page 113 fall into two groups which express two different worlds of experience. We are aiming at an education which will enable pupils to tell these groups apart as easily and surely as they can tell apples from plums. This is not merely of academic importance. We do not wish to institute examinations to test each pupil's knowledge. This kind of judgment is important because the very quality of life and the depth of experience of each one of us depend on it. It is also important to the quality of our society. Our new forms of architecture, industrial design and art must be based on informed judgment, so that these new forms are demanded and not merely accepted. Neither the forms of construction, communication and expression of our age, our visual language, nor the harmonious, humane conditions of life which are within our power, will come into being until each member of society is capable of playing his part.

Attempts have been made throughout Parts One and Two to make pupils see theory as a means of tackling practical work. We are, after all, dealing with a practical subject whose aim it is to bring about a deeper realisation of our environment and a new interest in the control of it. The point has now been reached when such practical work can go beyond class exercises of a limited scope. Instead of dealing with fragments we can now come to grips with whole self-contained schemes in which pupils can follow their own interests and initiative.

The analyses we can now undertake could, with some pupils, be started at an earlier age, depending upon their responsiveness, and should progressively take in greater portions of their environment. They should be encouraged to use all they have learnt. One could start with an examination of fairly simple objects of general interest. Such examinations should certainly touch not only on all the different angles we have discussed in Looking and Seeing so far, but could be supplemented by a type of 'consumer research' and finally drawn up in the form of an illustrated report, in which clarity of exposition should also be considered. The design analyses published from time to time in *Design Magazine* could serve as examples. Suggestions for improvements, fully documented, should be incorporated where applicable. Needless to say, both good and bad objects should be examined in this way. Next, larger and more complicated objects could be subjected to scrutiny, such as bicycles, sewing machines, and school equipment of all kinds.

Eventually the analysis of buildings should be undertaken. This may sound forbidding but will in actual practice be found to be not only feasible but also enjoyable. Most architects will be found to be appreciative of the aims of this course and therefore co-operative. Much information which may not be generally available will become accessible through a direct approach to an architect's office. Often he will be happy to supply prints of drawings which will help to form a more complete picture, especially of the more complex buildings. Press hand-outs and reprints of articles which dealt with definite buildings may also be available from them, even years after the opening of the buildings, or else referred to in back numbers of the relevant journals. This material could be used for a preliminary discussion, before the actual visit, and again after the visit.

If good architecture can be understood through a practical approach, bad and indifferent architecture can be recognised in a similar way. The local town hall or some such building with easily understood functions could become the subject of study. The enquiry should aim at finding out whether the existing form of the building is the best imaginable, when analysed in the manner of the examination of the Royal Festival Hall on pages 118 to 125, and whether pupils could suggest improvements. A certain amount of first-hand observation will be necessary for such a project and should preferably be carried out in small teams.

FOR FURTHER READING

The most concise survey of architecture and the salient forces which determined it is *The Observer's Book of Architecture*, by J. Penoyre and M. Ryan (Frederick Warne & Co., Ltd.). Professor Nikolaus Pevsner's *Outline of European Architecture* (Pelican) is incomparably fuller and more scholarly without being encyclopedic. It should be considered required reading, together with the same author's *Pioneers of Modern Design* (Pelican), which could perhaps be studied in conjunction with Part Three of Looking and Seeing. Those who wish to study the Gothic period in greater detail will find much of interest in *The Cathedral Builders*, by Jean Gimpel (Evergreen Books, Ltd.). H. Focillon's *Art of the West*, Part I: Romanesque, Part II: Gothic (Phaidon Press, Ltd.) is still the standard text on these periods for most purposes. *Introduction to Modern Architecture*, by J. M. Richards (Pelican) gives a good idea of what has happened in architecture since the end of the nineteenth century and why. The methods and outlook of the modern architect-engineer are fully described and documented in *New Structures*, by L. Nervi (Architectural Press, Ltd.). For starting a systematic study of buildings by great modern architects *Le Corbusier 1900-1960* (Girsberger, represented in Great Britain by Tiranti Ltd.) will be found invaluable. Industrial design is best served by *Design Magazine*, published monthly by the Council of Industrial Design. It contains a wealth of pictures and information and is always stimulating. The same can be said, in its own field, of *Architectural Review*, the journal of the Architectural Press. Articles and pictures on interior decoration, industrial design, gardening, town planning and art supplement those on architecture. It cannot be too strongly emphasised that both *Design Magazine* and *Architectural Review* should be available at all schools, for both teachers' and pupils' use, if visual education is to be a living reality. *Architectural Review* will also serve as a catalogue of important new buildings when school visits are planned. *New Architecture of London*, a pamphlet published by the British Travel and Holidays Association, and *Architecture Today*, an Arts Council publication, may serve similar purposes. *Interior Design*, by L. and H. Stevenson (Studio Vista, Ltd.) deals with most aspects of the use of colour, patterns and textures. *An Introduction to Color*, by Ralph M. Evans (John Wiley and Sons, Inc., New York) is a more specialised study.

PICTURE SOURCES

front endpaper

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